AEROLOGICAL OBSERVATIONS

[Aerological Division, W. R. Gregg, in charge]

By L. T. SAMUELS

Free-air temperatures during November averaged below normal at the eastern stations and at Pembina (table 1). The departures at Boston were of considerable magnitude. At Omaha, Dallas and San Diego, the temperatures averaged somewhat above normal. The relative humidity departures in general were of opposite sign to those of temperature.

Resultant free-air wind velocities were generally above normal except on the Pacific Coast where they were below normal (table 2). Resultant free-air wind directions were close to normal over the entire country except on the Pacific Coast where marked differences occurred. Of special interest in this connection is the change from a northerly component in the resultant wind over California at the 3,000-meter level to southerly at the 4,000-meter level. The normal at both these levels is northerly.

TABLE 1.—*Free-air temperatures and relative humidities obtained by airplanes during November 1933*

TEMPERATURE (° C.)

Altitude (meters) m.s.l.	Boston, Mass.[1] (6 meters)		Cleveland, Ohio[2] (246 meters)		Dallas, Tex.[3] (146 meters)		Norfolk, Va.[4] (3 meters)		Omaha, Nebr.[5] (300 meters)		Pembina, N.Dak.[6] (243 meters)		Pensacola, Fla.[4] (2 meters)		San Diego, Calif.[4] (9 meters)		Washington, D.C.[4] (2 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface	2.2	(7)	1.9	(7)	9.8	(7)	5.6	−3.0	1.3	(7)	−6.8	(7)	13.5	−0.1	15.7	−1.7	2.2	−3.0
500	0.1	(7)	2.4	(7)	13.2	(7)	5.7	−3.0	2.5	(7)	−6.4	(7)	13.4	+0.1	18.0	+0.9	2.0	−3.1
1,000	−1.9	−3.5	0.3	−0.5	12.6	+2.8	3.6	−2.9	4.2	+1.2	−6.5	−2.2	11.8	−0.1	18.7	+1.9	1.0	−2.9
1,500	−3.2	−4.3	−1.5	−1.1	11.5	+3.2			3.6	+1.4	−6.1	−1.6						
2,000	−4.9	−5.3	−2.0	+0.2	9.4	+2.9	0.1	−2.4	2.3	+1.9	−7.0	−1.0	7.7	−1.3	13.4	+1.5	−3.1	−3.8
2,500	−6.5	−4.8	−4.0	+0.1	6.7	+2.3			0.1	+2.0	−9.1	−1.0						
3,000	−8.5	−4.7	−6.1	+0.4	4.0	+2.0	−3.8	−3.4	−2.1	+2.4	−11.2	−0.5	2.1	−2.5	8.3	+1.7	−6.0	−3.7
4,000	−13.4	−4.8	−11.4	−0.1	−1.7	+1.6			−7.8	+2.2	−16.5	−0.3	−3.7	−2.5	0.6	+0.9		
5,000	−19.2	−4.2	−18.0	−0.7	−8.0	+1.2			−13.8	+1.8	−22.8	−0.8	−9.9	−2.5				

RELATIVE HUMIDITY (PERCENT)

Surface	73	(7)	78	(7)	82	(7)	74	−1	73	(7)	90	(7)	74	−6	64	+4	71	−3
500	73	(7)	76	(7)	65	(7)	66	+2	69	(7)	83	(7)	68	−5	49	−1	65	0
1,000	72	+8	79	+11	61	+2	62	+2	61	+3	80	+15	64	−3	31	−7	60	0
1,500	69	+10	76	+17	52	0			54	+1	68	+10						
2,000	67	+14	61	+8	46	−1	56	+2	45	−5	62	+7	57	+2	24	−5	58	+4
2,500	64	+13	57	+8	40	−2			43	−6	63	+8						
3,000	61	+11	56	+8	34	−4	47	+10	43	−7	60	+5	52	+7	21	−5	50	+9
4,000	57	+10	53	+9	29	−5			45	−6	56	+1	45	+4	20	−4		
5,000	58	+13	53	+7	23	−9			48	+1	55	−3	41	+4				

Times of observations: Weather Bureau, 5 a.m.; Navy, 7 a.m.; and M.I.T., 8 a.m. (E.S.T.).

[1] Airplane observations made by Massachusetts Institute of Technology; departures based on normals obtained from kite observations made at Blue Hills Meteorological Observatory.

[2] Temperature departures based on normals determined by extrapolating latitudinally those of Royal Center, Ind., and Due West, S.C. Humidity departures based on normals of Royal Center, Ind.

[3] Temperature departures based on normals determined by interpolating latitudinally those of Groesbeck, Tex., and Broken Arrow, Okla. Humidity departures based on normals of Groesbeck, Tex.

[4] Naval air stations.

[5] Temperature and humidity departures based on normals of Drexel, Nebr.

[6] Temperature departures based on normals determined by extrapolating latitudinally those of Ellendale, N.Dak., and Drexel, Nebr. Humidity departures based on normals of Ellendale, N.Dak.

[7] Surface and 500-meter level departures omitted because of difference in time of day between airplane observations and those of kites upon which the normals are based.

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a.m. (E.S.T.) during November 1933*

[Wind from N=360°, E=90°, etc.]

Altitude (meters) m.s.l.	Albuquerque, N. Mex. (1,554 meters)		Atlanta, Ga. (309 meters)		Bismarck, N.Dak. (518 meters)		Brownsville, Tex. (7 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (192 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	344	1.6	288	2.3	304	3.3	326	0.3	190	1.6	294	5.1	276	2.4	228	3.2	109	0.3	253	3.5	319	1.8	24	3.9
500			290	5.8			141	5.1	223	4.1			274	5.4	246	6.4	239	1.8			340	4.7	43	7.2
1,000			290	9.7	308	11.5	166	5.2	262	5.6			283	8.4	262	8.2	259	3.7	260	7.3	295	4.2	59	5.5
1,500			295	9.4	312	13.3	183	3.8	282	8.5			279	13.3	265	10.4	286	6.0	287	12.0	293	4.2	34	4.5
2,000	307	1.7	291	10.3	306	12.8	199	2.4	288	11.0	292	7.7	284	14.5	271	12.2	294	7.0	294	14.9	303	6.5	12	4.7
2,500	298	3.6	282	12.2	303	12.4	260	1.6	291	14.6	306	11.6	287	16.7	284	14.3	295	7.0	295	16.1	299	10.4	360	3.8
3,000	287	5.4	282	13.0	310	11.3	335	3.6	288	16.7	310	11.3					308	7.3	294	15.9	294	12.3	346	3.4
4,000	299	7.5	286	16.9			288	4.2			304	8.9					301	9.3	310	14.5			302	6.0
5,000	309	9.0					295	4.0			269	9.7												

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a.m. (E.S.T.) during November 1933*—Continued

Altitude (meters) m.s.l.	Los Angeles, Calif. (217 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (83 meters)		New Orleans, La. (2 meters)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (402 meters)		Omaha, Nebr. (306 meters)		Phoenix, Ariz. (338 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D.C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	359	0.8	189	0.6	262	0.7	34	1.2	31	1.1	262	1.3	311	0.7	90	1.8	141	3.5	53	1.0	153	1.5	297	1.9
500	28	.8	246	.2	272	4.7	40	1.7	30	4.3	222	2.8	294	3.3	79	3.8	------	------	140	1.1	221	4.1	289	5.9
1,000	44	1.7	137	1.0	287	8.3	321	2.5	28	4.0	256	5.2	306	9.0	76	3.2	------	------	313	2.6	228	5.4	287	9.5
1,500	56	1.5	117	2.5	288	8.9	316	3.2	19	1.6	271	4.2	306	11.5	87	2.0	165	2.6	316	4.4	250	5.1	293	12.4
2,000	92	1.5	61	1.7	298	10.1	294	6.3	356	1.6	289	7.0	300	12.9	99	.8	228	1.3	320	7.3	243	7.5	293	13.1
2,500	59	.9	13	2.4	302	11.8	300	7.6	350	2.0	291	8.4	300	14.0	179	.3	304	2.3	323	9.1	------	------	292	14.5
3,000	30	1.9	360	3.7	307	9.8	310	10.4	5	1.0	292	9.7	298	16.4	273	1.6	302	3.9	310	12.2	------	------	271	11.8
4,000	189	2.2	351	3.0	------	------	------	------	168	.9	285	10.6	285	12.4	274	3.7	315	8.9	------	------	------	------	------	------
5,000	------	------	------	------	------	------	------	------	95	3.3	------	------	------	------	354	2.7	335	8.2	------	------	------	------	------	------

RIVERS AND FLOODS

By RICHMOND T. ZOCH

[River and Flood Division, Montrose W. Hayes, in charge]

There were no floods in the rivers of the United States during November 1933.

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDonald, in charge]

NORTH ATLANTIC OCEAN

By W. F. McDONALD

The pressure situation.—High pressure was exceptionally persistent during November 1933 from the Azores to the Greenland Sea. The highest pressure over any part of the North Atlantic, (30.61 inches), was reported on the 9th by several ships in the vicinity of the Azores.

The major extra-tropical cyclones remained for the most part in high latitudes. The lowest recorded pressure was 28.19 inches on the 29th at Julianehaab, Greenland. The American Steamship *Quaker City* reported the lowest barometer reading at sea, 28.49 inches, on the 28th near 49°N., 45°W.

Average pressure for the month was below normal over the western Atlantic, especially in the region of Labrador and Davis Strait where the deficiency was more than two tenths of an inch. There was also a smaller deficiency in average pressure over the Iberian Peninsula. Elsewhere, Atlantic pressures were above normal with the greatest excess eastward from Iceland. (See table 1.)

Cyclones and gales.—At the opening of the month and throughout the first 10 days, storminess was mainly confined to the western Atlantic, south of the fiftieth parallel. Gales were mostly moderate to fresh, however, and in only two cases reached whole gale force, south of the Grand Banks.

From the 10th to the end of the month, gales were more widespread and in general more severe, and in the last decade winds of force 12 were encountered by two ships near mid-ocean on the main transatlantic route, in the first instance by the German Steamship *Europa* on the 22d, and again by the Danish Steamship *Maine* on the 26th. Between the 11th and 15th, on the 21st and 22d, and on the 27th and 28th winds of whole gale to storm force were experienced by a number of ships on the northern routes. (See Table of Ocean Gales and Storms.)

The increased intensity of storm conditions at the middle of the month brought about the only marine casualty of any importance which has been reported. The British Steamship *Saxilby*, bound eastward from Newfoundland to the British Isles on the 15th, called for assistance in latitude 51°50′ N., longitude 19°15′ W., and stated that the crew was taking to the ship's boats in heavy seas. Several steamers responded to this distress call but no trace of ship or crew could be found.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, November 1933*

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.41	------	30.08	3	28.19	29
Reykjavik, Iceland	29.75	+0.13	30.49	2	29.08	11
Lerwick, Shetland Islands	29.95	+.25	30.47	18	29.44	14
Valencia, Ireland	29.97	+.08	30.41	3	29.14	15
Lisbon, Portugal	29.95	−.09	30.28	1	29.43	17
Madeira	30.05	+.04	30.46	1	29.70	18
Horta, Azores	30.21	+.08	30.58	9	29.78	27
Belle Isle, Newfoundland	29.65	−.23	30.16	22	28.80	15
Halifax, Nova Scotia	29.90	−.05	30.38	29	29.28	15
Nantucket	29.93	−.12	30.47	17	29.14	27
Hatteras	30.07	−.04	30.61	17	29.55	26
Bermuda	30.04	−.04	30.36	29	29.66	7
Turks Island	29.94	−.05	30.06	17, 21, 29, 30	29.74	1, 2
Key West	30.05	+.03	30.36	16	29.70	[illegible]
New Orleans	30.15	+.05	30.51	16	29.76	[illegible]
Cape Gracias, Nicaragua	29.89	+.01	29.96	10, 11, 17	29.76	1

NOTE.—All data based mainly on a.m. observations, with departures compiled from best available normals related to time of observations, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

This casualty was caused by a deep cyclonic disturbance that, on the 14th, was central south of Iceland moving southeastward. After reaching Ireland on the 15th, the disturbance crossed the Bay of Biscay to the Iberian Peninsula, which it reached on the 18th and thereafter appeared to divide into two parts, one of which moved back again toward Ireland, greatly weakened in intensity. The movement of this disturbance between the 14th and 17th, within which time the *Saxilby* foundered, is shown in charts VIII to XI.